

WHAT IS CLAIMED IS:

1. A method of accelerating cement hydration reactions in an uncured cementitious composite material, comprising:

incorporating a multiple mode cement set accelerating agent in an uncured cementitious composition, wherein said accelerating agent comprises carbon dioxide reversibly sequestered in a carrier material, wherein the carrier material is capable of accelerating cement hydration reactions;

releasing the sequestered carbon dioxide from the carrier material; and

reacting both the carbon dioxide and carrier material with the uncured cementitious composition thereby accelerating the cement hydration reactions therein.

2. The method of Claim 1, wherein the uncured cementitious composition comprises a hydraulic binder, aggregates, and water.

3. The method of Claim 1, wherein the multiple mode cement set accelerating agent speeds up the cement hydration reactions by a combination of alkali activation and carbonation.

4. The method of Claim 1, wherein the carrier material is in a liquid form.

5. The method of Claim 4, wherein the carrier material is selected from the group consisting of alkanolamines, alkylamines, alkali carbonates, and mixtures thereof.

6. The method of Claim 1, wherein the accelerating agent is incorporated in a cementitious slurry.

7. The method of Claim 1, wherein the accelerating agent is incorporated in a cementitious paste.

8. The method of Claim 1, wherein the accelerating agent is incorporated in a cementitious green shaped article.

9. The method of Claim 8, wherein the accelerating agent is incorporated in a pre-selected region of the green shaped article, wherein the accelerating agent is absent in other regions of the green shaped article.

10. The method of Claim 9, wherein the pre-selected region of the green shaped article is selected from the group consisting of an exterior surface, a corner, an interior surface, and combinations thereof.

11. The method of Claim 9, wherein the accelerating agent is incorporated in the pre-selected region of the green shaped article by a process selected from the group consisting of spraying, dipping, pouring, brushing, and combinations thereof.

12. The method of Claim 9, wherein the carbon dioxide and carrier material accelerate the cement hydration reactions in the pre-selected region thereby resulting in a rapid formation of a partially cured zone in the green shaped article.

13. The method of Claim 9, further comprising autoclave curing the green shaped article following formation of the partially cured zone.

14. The method of Claim 9, wherein the stoichiometric amount of carbon dioxide sequestered in the carrier material is predetermined based on the amount of calcium hydroxide in the pre-selected region.

15. The method of Claim 1, wherein the release of the sequestered carbon dioxide from the carrier material is controlled by a process condition selected from the group consisting of temperature, pressure, pH and combinations thereof.

16. The method of Claim 1, wherein the uncured cementitious composition is configured for the manufacture of a building article.

17. A building article made in accordance with any one of the methods claimed above.